ELECTRO-DIAGNOSIS *and* ELECTRO-THERAPEUTICS

A GUIDE FOR PRACTITIONERS AND STUDENTS

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WITH EIGHT PLATES AND THIRTY-NINE ILLUSTRATIONS

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CHAPTER XI

SPECIAL PART

IV. Teslaization

(The Application of High-tension Currents, according to Tesla and d'Arsonval.)

Principle of the High-Frequency Current

THE Croatian engineer, Nicola Tesla, has for many years been making experiments in the employment of currents for technical purposes, which differ from all currents hitherto known in their immense strength (Tesla-currents). About at the same time with him—and seemingly quite independently—d'Arsonval made a thorough study of the effect of such currents of extraordinarily high tension on animals and on the human body.

These "high-tension currents" are obtained by changing direct currents of relatively low tension (*e.g.*, the dynamo direct currents of the municipal lighting system) into alternating currents of exceedingly great rapidity. This is done in the following manner:

The current from the central system or from a powerful accumulating battery, before it is led to the body, passes through a large inductorium, strengthened by means of condensers (Franklinic plates), a so-called Ruhmkorff spark-inductor, which, by means of an enormous increase of the coils and by very frequent interruptions (produced by a mercury interrupter) is made strong enough to produce, in certain cases, sparks of 25 to 50 cm. length (and more). If the Ruhmkorff is set going with the mercury interrupter in action, a current is received by conduction even from the secondary spiral, whose electromotor force (tension) is very great, considerably greater than the original and chiefly so as a result of the frequent change of direction in the induction-coil.

This high-tension alternating current is now conducted to two Leyden jars. As long as the induction-coil is active, there constantly leap between the dischargers of these jars sparks, whose strength and size grow with the power of the Ruhmkorff apparatus. These sparks, however, it has been proved, are not uniform streaks of light, but rather consist of innumerable, very rapid, invisible oscillations. Now, if the outer covering of the Leyden jars is connected with a solenoid (a short spiral of thick copper wire), there is produced in this latter a current with just as many interruptions as the leaping spark has oscillations; for every one of the hundred thousand oscillations per second which result means an interruption of the current circulating in the solenoid. Consequently, the current tension in the solenoid rises to from 100,000 to 1,000,000 volts.

This current may be conducted to the body from the solenoid itself or from a secondary spiral connected with it. It is so strong that, by mere radiation through the atmosphere, it causes an unconnected incandescent light to glow, tho held at a considerable distance (Tesla light).

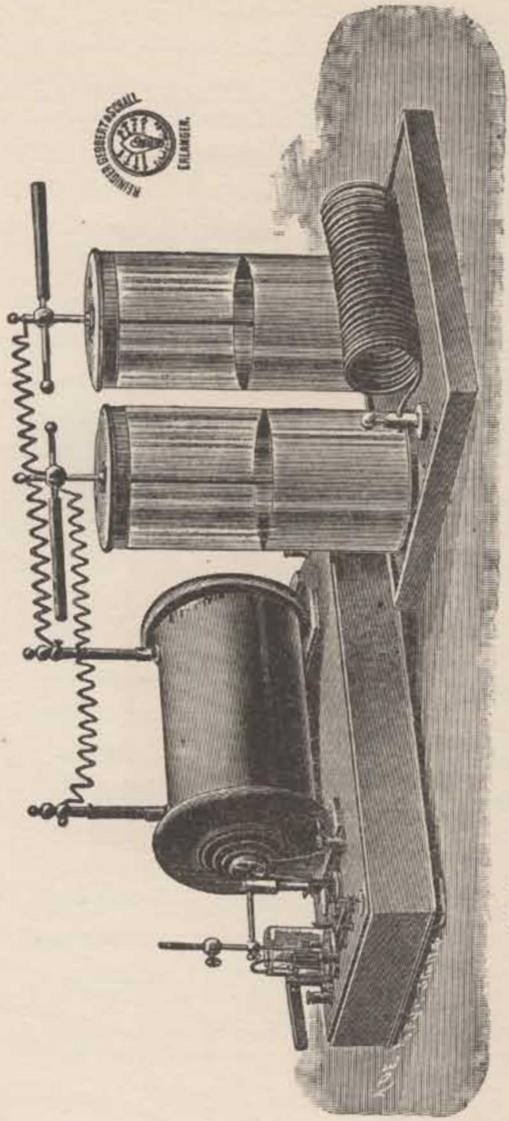

FIG. 46.—Apparatus for the Tesla Current—Ruhmkorff Inductor, Leyden Jars, and Solenoid.

In Figs. 46 and 47 there is shown one of the apparatus constructed for the application of "high-frequency currents," made by the firm of Reiniger, Gebbert & Schall

Instruments

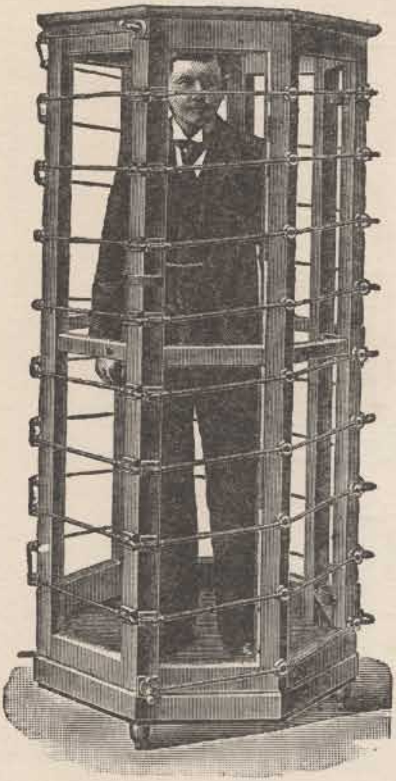

FIG. 47.—Large Solenoid for General Teslaization.

(without the wall-case and the current source). The diagram (Fig. 48) will explain the course of the current in such an apparatus.

From a current source (street-lighting system or accumulating batteries) connections pass through a wall-case to the Ruhmkorff. The case contains the apparatus for regulating the current (resistances, current-reverser) and for measuring (amperemeter). Often it contains also the mercury interrupter for the inductor (in Figs. 46 and 48 it is at the right of the Ruhmkorff).

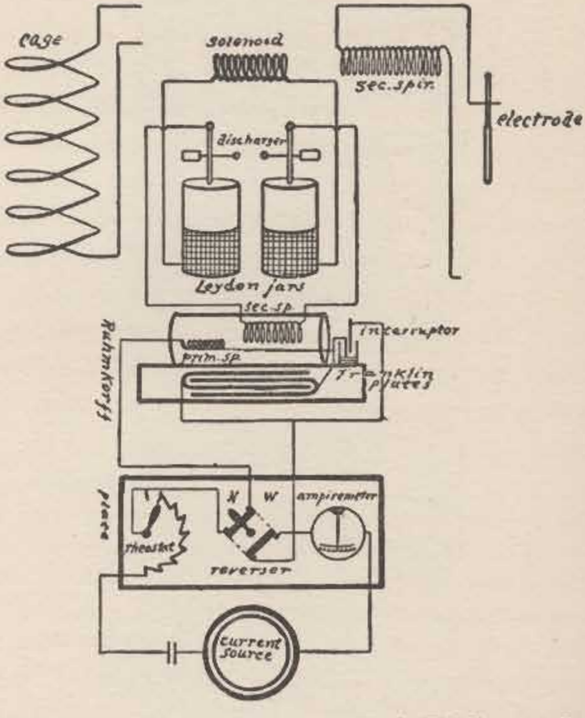

FIG. 48.—Diagram of Current Course in an Apparatus for High-Frequency Current.

The Ruhmkorff, which in most apparatus produces sparks of at least 25 cm. length, is connected with the condensers—the Leyden jars—by means of two conducting-wires. At the upper end of the inner coating of the jars there are two metal rods with balls at the ends (dischargers), while the conductors from the outer coating lead to the two ends of a solenoid. When the apparatus is working, the equalization of electrical tension occurs in the form of a powerful spark (whose length can be regulated by moving the dischargers). As has been said above, the numerous invisible oscillations of this spark produce the desired frequent change of current direction.

Physiology

From this enormously powerful current, which causes an incandescent light to glow by mere radiation, one should expect, *a priori*, an apparent and striking effect on the human body, especially on its motility and sensibility. This effect does not occur. As a rule, neither the local nor the general application of the Tesla-current causes either muscular contraction or sensation in the body.

Under longer influences (of the current), of course, a painful reddening of the skin, with swelling and occasional anesthesia, occurs, and when the part is touched lightly with the condensing electrode (to be mentioned later), a slight burning or prickly sensation, as well as slight contractions of the muscles, may be produced. But these phenomena are quantitatively out of all proportion to the immense current tension present.

Nevertheless, it is evident that the current passes the body, for if an incandescent bulb is placed in the hand of the person undergoing the test it begins to glow, but no sensation occurs.

Opinions differ as to how this fact is to be explained.

It is possible that the high-tension current produces opposite currents of equal tension in the body, by "self-induction" (see Extra Currents, page 27, footnote), and that these keep the current out of the interior of the body and merely allow it to glide over the surface, as it were; or it may be possible that the motor and sensory systems of the body are "focused" only for certain medium frequencies of current change, and respond as little to lesser and greater frequencies as the eye and the ear to lower or higher numbers of vibrations. Neither these two nor any other of the hypotheses offered have a sure foundation.

D'Arsonval's Experiments

The obvious inference that, lacking an external effect on the body, the internal effect of the Tesla current might be all the greater, seemed to be confirmed by d'Arsonval's experiments. He found, experimentally, increase of blood pressure in animals (reddening of the blood-vessels in the ear of a rabbit, etc.), as well as quickening of metabolic assimilation from the application of the high-frequency current, and he and other investigators, especially the French, believed that they had proved similar phenomena in human subjects. Further investigation (T. Cohn, A. Löwy, later Donner, Denobele, Carvalho, etc.) proved, however, that these observations were traceable to erroneous sources. The discoveries made by d'Arsonval as to the bactericidal effect of the Tesla current have also recently been contested energetically. Thus pretty nearly everything that has so far been reported as to the physiological effects of the Tesla current, as well as concerning the therapeutic indications for "teslaization," is of a more or less hypothetical nature.

Therapeutic Teslaization

Suggestion probably plays an important part in successful treatment (T. Cohn). Teslaization is especially recommended by French investigators (Apostoli, Oudin, Doumer, etc.), and by others agreeing with them, for the treatment of:

1. Diseases of metabolism: gout, diabetes, obesity, asthma, gall and kidney stones, rheumatism, anemia; also for malignant tumors.
2. Skin diseases: Eczema, acne, furunculosis, herpes, psoriasis, lichen ruber, lupus, exudative erythema etc., (According to Eulenburg, really favorable results seem to have been attained in the treatment of these cases.)
3. Nervous symptoms: neuralgias and nervous diseases of the heart.
4. Diseases in the urogenital region in both sexes, as well as hemorrhoids.
5. Lately even for the treatment of pulmonary phthisis.

Reports of cures, especially in cases of the last sort, should be received with the greatest skepticism. But it is very likely that the high-frequency current has a soporific effect.

In regard to injurious effects of the current, nothing reliable can be said. The statement made by some authors, that hysteria and neurasthenia are not influenced at all or else unfavorably by teslaization, is not true according to my experience. Further observations must prove how much truth there is in the reports of difficulty of breathing, dizziness, vomiting, and headache, as results of improper teslaization.

Methods The principal methods used are the following:

1. Local teslaization (direct conduction). Connections are made between both sides of the primary solenoid, or a secondary spiral of the same and the body of the patient (dressed); or with only one side of the solenoid, while the other is connected with the ground.

2. Condensation method (indirect conduction). A condenser is attached behind the solenoid or its secondary spiral before the current enters the body. Either a so-called condenser electrode is applied to the patient's body, or to a sofa (condenser bed), on which the patient lies, and whose under surface has a coating of metal. In both cases the body forms, as it were, the outer coating of a Leyden jar.

3. General teslaization (auto-conduction in a "cage"). A large upright solenoid (cage) is connected with the small solenoid. In it the patient may stand or sit without touching the conductor (see Fig. 47). The patient himself then forms a sort of closed conductor, encircled by the current (a secondary spiral, as it were). One need not be afraid of touching the coils of the solenoid or the conductors—as is clear from what has been said above, there is no sensation. (But an incandescent bulb on a short coil of wire, disconnected, introduced into the cage in place of the body, begins to glow.)

4. Resonance method (Oudin). A metal resonator, whose vibration numbers can be varied, is connected with a solenoid corresponding with it in capacity and

self-induction. The current, unipolar or bipolar, is conducted to the body by means of a glass electrode, which contains an oil-insulated metal wire.

Length of Application

The length of the application is from three to twenty minutes. The treatment should be repeated daily or every other day.

The instruments are very expensive. However, it is considerably cheaper if one already has a Ruhmkorff, especially if the apparatus can be attached to the public lighting system.